

UNITED STATES DISTRICT COURT

DISTRICT OF OREGON

PORTLAND DIVISION

ALLIANCE FOR THE WILD ROCKIES,  
INC.,

Plaintiff,

vs.

UNITED STATES ARMY CORPS OF  
ENGINEERS and UNITED STATES  
BUREAU OF RECLAMATION.

Defendants.

No. 3:16-cv-01407-HZ

**Declaration of Matthew Bradford Eppard**

I, Matthew Bradford Eppard, declare and state as follows:

1. I work for the U.S. Army Corps of Engineers ("Corps"), Portland District, as a Fishery Biologist. I have been in this position since January 2005. My primary duties include: (1) providing fish-related scientific information and guidance for environmental compliance processes, including assisting in preparation and technical review of Endangered Species Act ("ESA") Section 7 documents, such as biological assessments ("BAs"); and (2) developing and performing research to implement the NOAA Fisheries and U.S. Fish and Wildlife Service ("FWS") ESA Section 7 biological opinions for the operation and maintenance of the Federal Columbia River Power System ("FCRPS") and Willamette River Basin Flood Control Project ("Willamette Valley Project"). In October 2014, I was promoted to supervisory Fishery Biologist. I now supervise a staff of eleven Fishery Biologists that perform the same duties.

2. As detailed further below, I supervise staff that participated in the preparation and submittal of the "Supplemental Biological Assessment [for the] Effects of the Willamette River Basin Flood Control Project on Revised Bull Trout Designated Critical Habitat," dated September 27, 2016 ("Willamette Valley Project SBA"). ECF No. 25-9. I also provided technical level review of the same.

3. On May 15, 2017, Mr. Rock D. Peters, an employee of the Corps, Northwestern Division, submitted a Declaration in support of the Federal Defendants' Opposition to Plaintiff's Motion for Fees and Costs. ECF No. 46, ECF No. 47-7. Notations made on the face of the exhibits to Mr. Peters' Declaration was explained in a Federal Notice of Errata on May 19, 2017 (ECF No. 47); while the substance of the original May 15, 2017 declaration did not change, this Declaration will hereinafter refer to the May 19, 2017 Peters Declaration (ECF No. 47-7) and its exhibits (ECF No. 47-1 to 47-6). Mr. Peters' Declaration discussed the timeline and context of

the ESA Section 7 consultations for both the FCRPS and Willamette Valley Project, following the FWS' revision of bull trout critical habitat on October 18, 2010. This Declaration is submitted to the Court to supplement the information contained in Mr. Peters' Declaration in regard to the Willamette Valley Project consultation, since Mr. Peters retired from Federal Service in December 2017.

4. The Willamette Valley Project is the Corps' system of 13 dams and reservoirs (11 are multiple purpose storage reservoirs and two are re-regulating reservoirs), an authorized navigation channel, and bank protection works in the Willamette River Basin, Oregon. The Willamette Valley Project consists of extremely complex individual projects that are operated as a system to meet multiple Congressionally-authorized purposes, including flood risk management, hydropower, water supply, fish and wildlife, water quality, and recreation. While the changes to critical habitat in 2010 were minor in the Willamette basin, the geographic area that encompasses the critical habitat included approximately 194 miles of stream and 8,900 acres of reservoir surface area. This large geographic area combined with the complex habitat in the basin that had to be considered made the Willamette Valley Project SBA difficult to complete.

5. As Mr. Peters' Declaration particularly explained, the Corps worked on the Willamette Valley Project SBA between 2011 and September 27, 2016, when the final SBA was submitted to FWS to initiate formal ESA Section 7 consultation. ECF No. 47-7, at ¶¶ 24-26 and 28. Also as Mr. Peters' Declaration explained, the Corps distributed a "near final draft" of the Willamette Valley Project SBA to the Bonneville Power Administration ("Bonneville") and the U.S. Bureau of Reclamation ("Reclamation") for review between November, 2011 and January, 2012, but was not able to finalize and submit a final SBA to FWS in 2012 "due to unavoidable limitations on manpower and a resulting reprioritization of workload as a result of an assessment that the changes to critical habitat in the 2010 designation were minor." ECF No. 47-7, at ¶¶ 26 and 27. This Declaration specifically provides more detail on the events between 2012 and the filing of Plaintiff's suit on July 11, 2016 (ECF No. 1).

6. The primary staff member involved in the preparation of the Willamette Valley Project SBA for the Corps was Mr. Greg Smith. Mr. Smith served as an Environmental Resource Specialist in the Planning, Programs, and Project Management Division, Environmental Branch at the Corps Portland District from July 2008 until August 2015. Mr. Smith performed the initial work on the Willamette Valley Project SBA during the 2011 to 2012 timeframe, and sent out various iterations of the document for both internal and external review. *See* ECF No. 47-7, at ¶¶ 24-27 (generally referencing work performed during 2011 to 2012); *See* ECF No. 46-17 (referencing Greg Smith as the Corps' staff contact for the FWS consultation). It was during this timeframe when I first reviewed the Willamette Valley Project SBA in a technical capacity.

7. Starting sometime in 2012, Mr. Smith was directed by his supervisors to work on other higher priority actions, including the SBA for the ESA Section 7 consultation with the FWS on the operation and maintenance of the FCRPS. The FCRPS FWS consultation became one of the priority items for Mr. Smith since there was a greater change to critical habitat for those projects as opposed to the Willamette basin. *See* ECF 47-7, at ¶ 27 ("...Corps staff was not able to finalize and submit the draft [Willamette Valley Project] SBA to FWS in 2012 due to unavoidable limitations on manpower and a resulting reprioritization of workload as a result of



an assessment that the changes to critical habitat in the 2010 designation [for the Willamette] were minor.”). Due to high turnover of Corps staff and higher priority projects needing to be completed by environmental compliance staff, no other staff were available to complete the Willamette Valley Project SBA. Mr. Smith’s supervisors during the relevant time period were Ms. Joyce Casey, Chief, Environmental Branch, and Ms. Judith Marshall, Environmental Branch, Environmental Compliance Section Chief. Ms. Casey retired from Federal service in June 2018. Ms. Marshall retired from Federal service in 2017. Mr. Smith was not provided funding for his continued work on the Willamette Valley Project SBA; however, he occasionally updated the SBA, time permitting, including in 2014 (while on temporary detail to the Willamette Valley Project) and in 2015 (including an update in the late spring/early summer of 2015 prior to leaving employment with the Corps). True and correct copies of these drafts are attached as Exhibits 1 and 2, respectively. The 2014 revisions were in response to comments received from Bonneville Power Administration. The 2015 revisions included removing Oregon chub critical habitat information from the Willamette Valley Project SBA due to their delisting in 2015.

8. In August 2015, Mr. Smith was hired by Bonneville. Since Mr. Smith was the primary staff member for the Corps working on the Willamette Valley Project SBA, his departure to Bonneville stalled additional work by the Corps on the SBA.


9. The Corps received the Plaintiff’s notice of intent to sue (“NOI”) under the ESA from the Plaintiff in this litigation on May 6, 2016. ECF No. 25-6. At that time, Corps staff and counsel coordinated with counsel and staff from the other Federal Defendants to respond to the NOI. A letter response was sent from the Corps to the Plaintiff on June 30, 2016. ECF No. 25-6. In regards to the Willamette Valley Project SBA, the letter stated that the “federal agencies expect to submit a final biological assessment to USFWS in early fall 2016.” *Id.* at 2.

10. While the response to the NOI was being prepared, the Corps and Bonneville also discussed utilizing Mr. Smith, with his knowledge of the Willamette Valley Project SBA, as a resource to help finalize the document. Bonneville informally provided some of Mr. Smith’s time towards that effort, as indicated in an email from Ms. Casey to Corps and Bonneville counsel and Mr. Peters on June 20, 2016. A true and correct copy of this email is attached as Exhibit 3. In this email, it was estimated that the Willamette Valley Project SBA would be completed in “30 to 45 days.” *Id.* Mr. Smith immediately began working on finalizing the draft Willamette Valley Project SBA, and coordinated his work with both Bonneville and Corps staff and counsel (and with larger Federal Defendants, including Reclamation). To finalize the draft Willamette Valley Project SBA, Mr. Smith and Corps staff performed GIS analyses and prepared maps that identified the impacted areas. This work was well underway prior to the Plaintiff’s complaint being filed on July 11, 2016. ECF No. 1.

11. The Corps and Bonneville (and all Federal Defendants, including Reclamation) continued to coordinate and work on the SBAs for both the FCRPS and Willamette Valley Project. In August 2016, I assigned Mr. Sean Tackley, a Corps Portland District Fishery Biologist, to work with Mr. Smith to finalize and submit the Willamette Valley Project SBA to FWS and formally complete the initiation of ESA Section 7 consultation, since the Corps is the lead federal action agency for consultation related to operation and maintenance of the Willamette Valley Project.

As Mr. Tackley's supervisor, I reviewed the Willamette Valley Project SBA. The Willamette Valley Project SBA was submitted to FWS on September 27, 2016, in accordance with the schedule that the Corps outlined in its response letter to the NOI, and the USFWS formally confirmed that the SBA was a completed consultation initiation package on October 27, 2016. ECF No. 46-19. Although the NOI influenced the completion of the Willamette Valley Project SBA, the filing of Plaintiff's complaint did not alter or accelerate the schedule for completion. Even if the Plaintiff had not filed its complaint, it is my belief that the Corps would have submitted the Willamette Valley Project SBA to FWS on the same schedule as outlined in the Corps' response to the NOI.

I declare under penalty of perjury that the foregoing is true and correct. Executed on December 6, 2018, in Portland Oregon.

  
Matthew Bradford Eppard, Supervisory Fishery Biologist  
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# **Exhibit 1**

**Biological Assessment**  
**Effects of the**  
**Willamette River Basin Flood Control Project**  
**On**  
**Oregon Chub and Bull Trout**  
**Designated Critical Habitat**



*Submitted by:*  
**U.S. Army Corps of Engineers, Portland District**  
**Bonneville Power Administration**  
**Bureau of Reclamation**

*Submitted to:*  
**U.S. Fish and Wildlife Service**

**Draft November, 2011**

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## 1. Introduction

The U.S. Army Corps of Engineers (Corps) operates 13 dams and reservoirs in Oregon's Willamette River Basin (Willamette Project). The Corps is authorized by Congress to construct, operate and maintain the Willamette Project for such purposes as flood control, navigation, hydropower generation, recreation, fish and wildlife, water quality, and municipal and industrial water supply, irrigation, and recreation. The Willamette Project is authorized principally by three separate successive Flood Control Acts: 1938, 1950, and 1960. House Document 531, authorized by the Flood Control Act of May 17, 1950 (81<sup>st</sup> Congress, 2<sup>nd</sup> Session) remains the overall guiding legislation pertaining to operation and maintenance of the project.

The Willamette Project, located entirely in western Oregon, was constructed to take the peak off of flood events in response to decades of catastrophic flooding and also provides a wide array of additional benefits to the citizens of Oregon and the region. For the purposes of Endangered Species Act (ESA) Section 7 consultation, the Willamette Project consists of 13 multipurpose dams, five fish hatcheries, and approximately 42 miles of revetments in the upper Willamette River Basin of western Oregon. The Corps operates and maintains the dams and revetments and funds the State of Oregon via the Oregon Department of Fish and Wildlife (ODFW) to manage and operate all facilities associated with the Willamette Hatchery Mitigation Program. Bonneville Power Administration (BPA) markets the hydropower generated at the dams, and the U.S. Bureau of Reclamation (Reclamation) contracts for a portion of the storage space in the Project reservoirs for irrigation. These three Federal agencies are considered the "Action Agencies" for the ESA consultation.

Since the early 1990s, the Willamette Project Action Agencies have engaged with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service [(USFWS) collectively referred to as the Services] on actions concerning operation and maintenance of the Willamette Project that may affect ESA-listed species or these species' designated critical habitat.

Beginning in April 2000, the Action Agencies prepared a biological assessment (Willamette BA) and formally consulted with the USFWS and NMFS on the effects of the operation and maintenance of the Willamette Project on ESA-listed species under their jurisdiction. A Supplemental Biological Assessment (Supplemental BA) and an Addendum to the Supplemental Biological Assessment (Addendum) were provided to the Services with additional information on the proposed action in, respectively, June and August 2007. On July 11, 2008 the USFWS and NMFS each separately issued their biological opinions: "*Continued Operation and maintenance of the Willamette Basin Project to Oregon Chub, Bull Trout, and Bull Trout Critical Habitat Designated Under the Endangered Species Act*" (USFWS BiOp) and "*Consultation on the 'Willamette River Basin Flood Control Project'*" (NMFS BiOp) respectively (collectively referred to as the 2008 BiOps).

The NMFS BiOp concluded that the proposed operations and maintenance of the Willamette Project was likely to jeopardize upper Willamette River Evolutionary Significant Unit (ESU) of Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*O. mykiss*) and was likely to



adversely modify designated critical habitat for these species (NMFS 2008). The NMFS BiOp also included a Reasonable and Prudent Alternative (RPA) to the Action Agencies proposed action that if implemented, would not result in jeopardy or adversely modify designated critical habitat for these species (NMFS RPA). The USFWS BiOp concluded that the proposed action, as modified by the NMFS RPA, was not likely to jeopardize the continued existence of Oregon chub (*Oregonichthys crameri*) or bull trout (*Salvelinus confluentus*) nor was it likely to adversely modify or destroy bull trout designated critical habitat (USFWS 2008).

The 2008 BiOps address operations and maintenance of the Willamette Project and conservation actions in multiple areas, including: habitat access and passage; water quantity and quality; habitat, hatcheries; fisheries, and research; monitoring, and evaluation (RM&E). The Corps is actively engaged in implementing the 2008 BiOps, particularly structural and operational modifications designed to minimize adverse effects and ultimately conserve the listed species and their designated critical habitats that are affected by the operation and maintenance of the Willamette Project.

On March 10, 2010 the U.S. Fish and Wildlife Service (USFWS) designated critical habitat for Oregon chub in the Willamette basin of Oregon (75 FR 11010). On October 18, 2010 the USFWS revised designated critical habitat for bull trout in five western states, including Oregon (75 FR 63898).

The Action Agencies have prepared this biological assessment (2014 BA) to evaluate the effects of implementing the proposed action, as modified by the NMFS RPA, for the operation and maintenance of the Willamette Project on new designated critical habitat for Oregon chub and revised designated critical habitat bull trout.

The effects to Oregon chub, bull trout, and the other ESA-listed species addressed in the NMFS or USFWS BiOps have not changed nor have any new effects not previously considered been identified. The determinations for those species remain unchanged from those identified in the USFWS BiOp and effects to these species will not be addressed further in this consultation. Therefore, this 2014 BA will specifically address the effects of the proposed action, as modified by the NMFS RPA, on newly designated critical habitat for Oregon chub and revised critical habitat for bull trout.

## **2. Description of the Proposed Action**

The action proposed by the Action Agencies is described in the Willamette BA, and subsequent Supplemental BA and Addendum, and consists of multiple, separate actions that address the effects of:

- The operation and maintenance of 13 Federal dam and reservoir projects that are operated by the Corps as an integrated system for flood control, navigation, power generation, fish and wildlife, recreation, irrigation, and water quality and quantity.

- The operation and maintenance of approximately 42 miles of revetments within the Willamette River Basin.
- The operation and maintenance of five fish hatcheries.
- The operation and maintenance of Reclamation's allocation of irrigation water.
- The management of land around Willamette Project dams and reservoirs for recreation and other purposes, the bank protection program, emergency assistance program, and a suite of conservation actions to minimize Willamette Project effects on listed species and designated critical habitat.

### **2.1. National Marine Fisheries Service Reasonable and Prudent Alternative**

The NMFS RPA is additive to the Action Agencies proposed action and identifies additional actions necessary to ensure that the proposed action will not jeopardize listed anadromous salmonids or adversely modify their designated critical habitat. The NMFS RPA lists 96 actions that more specifically defined the proposed action in the following 10 categories: coordination; flow management; water contract program; fish passage; water quality; hatcheries; habitat; ESA compliance; construction projects environmental coordination and management; research, monitoring, and evaluation, and maintenance. The Corps continues to work with the other Action Agencies, and regional stakeholders to implement these actions consistent with the adaptive management process and regional coordination outlined in the 2008 BiOps.

A detailed description of the proposed action, as modified by the NMFS RPA can be found in Section 5 (beginning on page 38) of the USFWS BiOp and is herein incorporated by reference.

## **3. Action Area**

The geographic area of this 2014 BA is consistent with the description of the Willamette Project action area identified in the respective Willamette Project BAs and 2008 USFWS BiOp<sup>1</sup> (Figure 1). Generally, the geographic scope addressed in this 2011 BA encompasses the areas that are hydrologically influenced by the operation of the Willamette Projects, including:

- All river reaches, riparian zones, and floodplain areas located downstream of the 13 Willamette Project dams, including the mainstem Willamette River and the tributaries on which these facilities are located (i.e., mainstem reaches of the North Santiam and South Santiam rivers, Santiam River, McKenzie River, South Fork McKenzie River, Blue River, Fall Creek, Middle Fork Willamette River, Row River, Coast Fork Willamette River, and the Long Tom River). This action area also encompasses the 42 miles of streambank revetments maintained by the Corps and the adjacent stream reaches affected by those revetments.

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<sup>1</sup> A detailed description of the Willamette Project action area is in the 2008 USFWS BiOp (Section 4).

- Stream reaches and land areas permanently or seasonally inundated by Willamette Project reservoirs in dry, average, and wet years.
- All reaches of tributaries located upstream of Willamette Project dams that are presently or were historically accessible to listed fish before construction of the 13 dams in the Willamette Project.

The operations and maintenance of the Willamette Project was determined to have “no effect” on the bull trout critical habitat in the mainstem Columbia River, and is therefore not included in the evaluation of effects in this biological assessment.

Figure 1. The Willamette Project.





## 4. Status of Critical Habitat

The USFWS published a final rule designating critical habitat for Oregon chub on March 2010 (75 FR 11010) and revised critical habitat for bull trout on October 2010 (75 FR 63898). The ESA defines critical habitat as "the specific areas within the geographical area occupied by the species, at the time it is listed..., on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed...upon a determination by the Secretary that such areas are essential for the conservation of the species."

### 4.1 Oregon Chub Critical Habitat

Designated critical habitat for Oregon chub includes 25 Critical Habitat Units (CHU) totaling approximately 132 acres, in four watersheds, including land under State (Oregon Department of Transportation [ODOT] and Oregon Parks and Recreation Department [OPRD]), Federal (Corps, USFWS, and U.S. Forest Service [USFS]), other government, and private ownership (75 FR 11010) (Table 1). Five CHUs are on Corps lands, three are on US Forest Service (USFS) lands, six are on State of Oregon lands, two are on local government lands, three are on USFWS lands, five are on private lands and one is on both USFWS and private land. Of these sites, 15 may be affected by the operation and maintenance of the Willamette Project (Table 1).

Major alteration of the floodplain for flood control, navigation, agricultural development, and other actions (e.g., revetment construction and maintenance) that simplified or modified channel form and development have resulted in a significant reduction in Oregon chub habitat in the Willamette River Basin. In general, designated critical habitat for Oregon chub represents some of the best remaining habitat available in the Willamette River Basin, containing physical and biological features essential to the conservation of the species.

**Table 1. Oregon Chub Critical Habitat Units**

	Critical Habitat Unit	Name	Ownership	Acres	May Affect
Santiam Recovery Area	1A	Santiam I-5 Side Channels	ODOT	3.3	Yes
	1B(1)	Geren Island North Channel	City of Salem	1.9	Yes
	1B(2)	Stayton Public Works Pond	City of Stayton	1.0	Yes
	1B(3)	South Stayton Pond	ODFW	0.2	Yes
	1B(4)	Gray Slough	Private	6.2	Yes

	Critical Habitat Unit	Name	Ownership	Acres	May Affect
	1C	Foster Pullout Pond	Corps	1.0	No
Mid-Willamette Recovery Area (including McKenzie River subbasin)	2A(1)	Russell Pond	Private	0.1	No
	2A(2)	Shetzline Pond	Private	0.3	No
	2A(3)	Big Island	Private	8.2	Yes
	2B(1)	Ankeny Willow Marsh	USFWS	34.5	No
	2B(2)	Dunn Wetland	Private	15.2	No
	2B(3)	Finley Display Pond	USFWS	2.4	No
	2B(4)	Finley Cheadle Pond	USFWS	2.3	No
	2B(5)	Finley Gray Creek Swamp	USFWS	7.4	No
Middle Fork Willamette Recovery Area	3A	Fall Creek Spillway Ponds	Corps	3.8	Yes
	3B	Elijah Bristow State Park Berry Ponds	OPRD	12.7	Yes
	3C	Elijah Bristow State Park Northeast Slough	OPRD	5.4	Yes
	3D	Elijah Bristow SP Island Pond	OPRD	5.2	Yes
	3E	Dexter Reservoir Alcove Pond DEX3	Corps	0.9	Yes
	3F	Dexter Reservoir Alcove PIT1	Corps	0.3	Yes
	3G	East Fork Minnow Pond	ODOT	3.3	No
	3H	Hospital Pond	Corps	1.1	Yes
	3I	Shady Dell Pond	USFS	2.8	Yes
	3J	Buckhead Creek	USFS	9.3	Yes
	3K	Wicopee Pond	USFS	3.3	No

#### 4.1.2. Primary Constituent Elements for Oregon Chub Critical Habitat

Within designated critical habitat the primary constituent elements (PCEs) are those specific physical and biological features known to be essential to the conservation of Oregon chub and may require special management consideration or protections (50 CFR 402.2).

The PCEs essential for the conservation of Oregon chub include, but are not limited to:

1. Off-channel water bodies such as beaver ponds, oxbows, side-channels, stable backwater sloughs, low-gradient tributaries, and flooded marshes, including at least 0.12 acre (ac) of aquatic surface area at depths between approximately 1.6 and 6.6 feet
2. Aquatic vegetation covering a minimum of 0.06 ac (or between approximately 25 and 100 percent) of the total surface area of the habitat. This vegetation is primarily submergent for purposes of spawning, but also includes emergent and floating vegetation and algae, which are important for cover throughout the year. Areas with sufficient vegetation are likely to also have the following characteristics: Gradient less than 2.5 percent; no or very low water velocity in late spring and summer; silty, organic substrate; and abundant minute organisms such as rotifers, copepods, cladocerans, and chironomid larvae.
3. Late spring and summer subsurface water temperatures between 59 and 78 °F, with natural diurnal and seasonal variation.
4. No or negligible levels of nonnative aquatic predatory or competitive species. Negligible is defined for the purpose of this rule as a minimal level of nonnative species that will still allow the Oregon chub to continue to survive and recover.

Major threats to Oregon chub critical habitat PCEs include competition and predation from non-native fishes; the potential for initial or further introduction of non-native fish; vegetative succession of shallow aquatic habitats; possible agricultural or forestry chemical runoff; possible excessive siltation from logging in the watershed; other threats to water quality (including threat of toxic spills, low dissolved oxygen); and fluctuations in water level due to regulated flow management at flood control dams, as well as low summer water levels (75 FR 11019). Additionally, the threats associated with reduced genetic diversity due to the low level of mixing between populations are of concern.

While competition and predation from non-native fish are considered the greatest threat to recovery of Oregon chub, other threats may be significant. Special management considerations are needed in most of the CHUs to address the impacts of competition and predation by non-native fishes or to avoid the potential introduction of non-native fishes, vegetative succession, maintenance of water quality, and maintenance of appropriate water levels. Table 2 describes the baseline condition of each PCE and the leading cause of the current condition.

**Table 2. Baseline Condition of Oregon Chub Critical Habitat in the Willamette Basin**

PCE#	Primary Constituent Element	Baseline Condition	Leading Cause(s) of Baseline Condition
1	Off-channel water bodies such as beaver ponds, oxbows, side-channels, stable backwater sloughs, low-gradient tributaries, and flooded marshes, including at least 0.12 ac of continuous aquatic surface area at depths between approximately 1.6 and 6.6 ft.	<p>Degraded baseline condition throughout the Willamette River Basin due to modified flows and channel simplification below dams in the Santiam River (including both the North and South Santiam Rivers), McKenzie River, and Middle Fork and Mainstem Willamette Rivers.</p> <p>Construction and operation of flood control and hydropower dams trap sediment and large woody debris and reduce peak flow events important to maintain and create off-channel complexity. Construction and maintenance of revetments has reduced channel migration zones, eliminating creation and maintenance oxbows and side channels. The result is a relatively static and simplified riverine aquatic habitat below dams.</p>	Construction and operation of flood control and hydropower dams in Willamette River tributaries. Construction and maintenance of revetments in the Willamette River and associated tributaries.



PCE#	Primary Constituent Element	Baseline Condition	Leading Cause(s) of Baseline Condition
2	Aquatic vegetation covering a minimum of 0.06 ac (or between approximately 25 and 100 percent) of the total surface area of the habitat. This vegetation is primarily submergent for purposes of spawning, but also includes emergent and floating vegetation and algae, which are important for cover throughout the year. Areas with sufficient vegetation are likely to also have the following characteristics: Gradient less than 2.5 percent; no or very low water velocity in late spring and summer; silty, organic substrate; and abundant minute organisms such as rotifers, copepods, cladocerans, and chironomid larvae.	Degraded baseline condition throughout the Willamette River Basin due to modified flows and channel simplification below dams in the Santiam River (including both the North and South Santiam), McKenzie River, and Middle Fork and Mainstem Willamette Rivers. Reduction in peak flows and revetment construction and maintenance of revetments have resulted in less off channel formation and flushing of sediments from some areas leading to vegetative succession and potential habitat loss.	Construction and operation of flood control and hydropower dam in Willamette River tributaries. Construction and maintenance of revetments in the Willamette River and associated tributaries.
3	Late spring and summer subsurface water temperatures between 59 and 78 °F, with natural diurnal and seasonal variation.	Generally altered hydrograph throughout the Willamette River Basin due changes in timing and volume of flows released from dams in the Santiam River (including both the North and South Santiam), McKenzie River, and Middle Fork and Mainstem Willamette Rivers. Late spring and summer temperatures are less affected than late summer and fall temperatures.	Construction and operation of flood control and hydropower dams in Willamette River tributaries. Construction and maintenance of revetments in the Willamette River and associated tributaries.

PCE#	Primary Constituent Element	Baseline Condition	Leading Cause(s) of Baseline Condition
4	No or negligible levels of nonnative aquatic predatory or competitive species. Negligible is defined for the purpose of this rule as a minimal level of nonnative species that will still allow the Oregon chub to continue to survive and recover.	Degraded baseline in those CHUs that are hydrologically (even temporarily) connected to the Santiam River (including both the North and South Santiam), McKenzie River, and Middle Fork and Mainstem Willamette Rivers. In some cases, reduced peak flows have isolated some off-channel habitats, reducing access to these habitats by non-native fish that predate or compete with Oregon chub.	Initial introduction of exotic fishes and bull frogs by the State of Oregon Fish, combined with habitat modification from construction and operation of flood control and hydropower dams and construction and maintenance of revetments in the Willamette River and associated tributaries.

#### 4.2 Bull Trout Critical Habitat

The USFWS has established six draft recovery units for bull trout in the Pacific Northwest; the Upper Willamette River CHU is part of the Coastal Recovery Unit. Within the Willamette River Basin, bull trout critical habitat is limited to part of the McKenzie River drainage, part of the Middle Fork Willamette River drainage, and a short segment of the mainstem Willamette River (75 FR 63898). The revised critical habitat designation for bull trout did not significantly expand the original critical habitat definition beyond its former designation. Rather, it filled in gaps such as Cougar, Lookout Point, Dexter, and Hills Creek Lakes, and expanded the official critical habitat further up streams such as the South Fork McKenzie River, the Middle Fork Willamette River and Swift Creek, whereas before it only included limited segments of those streams.

There are three known bull trout local populations in the McKenzie River and Middle Fork subbasins of western Oregon. With the exception of a short reach of the mainstem Willamette River and the mainstem Middle Fork Willamette River (including reservoirs) below Hills Creek Dam, segments designated as critical habitat are occupied by bull trout. Designated critical habitat in the Middle Fork Willamette River downstream of Dexter Dam is currently unoccupied by bull trout. Designated critical habitat between Hills Creek Dam and Lookout Point Dam may be occupied by bull trout entrained through Hills Creek Dam, but documentation is limited to a single individual caught by an angler in 2000 (USFWS 2008). Most of the critical habitat within the Willamette Project action area is considered foraging, migration, or overwintering (FMO) habitat, with suitable spawning and juvenile rearing habitat generally occurring farther upstream and outside of lands affected by the Willamette Project.

In the Willamette River Basin, approximately 194.1 miles of stream and 8,889.5 acres of lake surface area are designated as bull trout critical habitat in the McKenzie River and Middle Fork Willamette River subbasins (75 FR 63938), primarily in Lane County, but extending into Linn County. The operation and maintenance of the Willamette Project may affect critical habitat in the South Fork McKenzie River from the upstream end of Cougar Lake downstream to the confluence with the mainstem McKenzie River, in the mainstem McKenzie River from the confluence of the South Fork McKenzie River downstream to the confluence with the

Willamette River, in Blue River from the dam downstream to the confluence with the McKenzie River, in the Middle Fork Willamette River from the upstream end of Hills Creek Lake downstream to the confluence of the mainstem Willamette River, and the mainstem Willamette River from the confluence with the Middle Fork to the confluence with the McKenzie River. In total, the operation and maintenance of the Willamette Project may affect bull trout critical habitat in 106.8 river miles and 8,889.5 acres of lake surface.

Major alteration of the floodplain for flood control, navigation, agricultural development, and other actions (e.g., revetment construction and maintenance) that simplified or modified channel form and development have resulted in a significant reduction in bull trout habitat in the Willamette River Basin. Construction of flood control and hydropower dams have created barriers to fish passage that now leave all populations of bull trout in the Willamette River basin isolated and unable to migrate among subbasins; however, construction and operation of the Cougar Dam fish trap and haul facility has improved upstream migration for bull trout in the South Fork McKenzie River. It is noteworthy that, due to the negative public perception of bull trout, before the construction of the Willamette Valley Flood Control Project bull trout were already substantially damaged by formal management actions such as the use of rotenone in bull trout habitat and the liberal stocking of exotic trout species.

#### **4.2.1. Primary Constituent Elements for Bull Trout Critical Habitat**

Within designated critical habitat the PCEs are those specific physical and biological features known to be essential to the conservation of bull trout and may require special management consideration or protections.

The PCEs essential for the conservation of bull trout include, but are not limited to:

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
2. Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent or seasonal barriers.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, and undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
5. Water temperatures ranging from 36 to 59°F, with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within

this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.

6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.
7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9. Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

Among the many factors that contribute to degraded PCEs, those which appear to be particularly significant and have resulted in a legacy of degraded habitat conditions include fragmentation and isolation of local populations due to the proliferation of flood control dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements; degradation of spawning and rearing habitat and upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads; the introduction and spread of nonnative fish species by the state of Oregon through fish stocking, and degraded habitat conditions, which compete with bull trout for limited resources; and degradation of foraging, migratory, and overwintering habitat resulting from reduced prey base, roads, agriculture, development, and flood control dams. Table 3 describes the baseline condition of each PCE and the leading cause of the current condition.



**Table 3. Baseline Condition of Critical Habitat in the Upper Willamette Core Area**

PCE#	Primary Constituent Element	Baseline Condition	Leading Cause(s) of Baseline Condition
1	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	Critical habitat area does not support this bull trout PCE.	
2	Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	Degraded baseline condition in both the McKenzie and Middle Fork Willamette rivers. Three of four bull trout local populations isolated above dams. Lack of access to historical FMO habitat. Lack of passage at numerous dams within designated critical habitat. Upstream passage improvement in South Fork McKenzie River from construction and operation of Cougar Dam trap and haul facility.	Construction and operation of flood control and hydropower dams owned by Corps and Eugene Water and Electric Board (EWEB).
3	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Significantly degraded baseline. Altered flow and temperature regimes below dams (and associated habitat effects) along with migratory blockage of anadromous fish at impassable dams, have significantly impacted the productivity of stream reaches within bull trout critical habitat.	McKenzie River – construction and operation of flood control and hydropower dams owned by Corps and EWEB.  Middle Fork Willamette River – construction and operation of Corps dams for flood control.
4	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	Degraded baseline condition in both the McKenzie and Middle Fork Willamette rivers. Construction and operation of flood control and hydropower dams trap sediment and large woody debris and reduce peak flow events important to maintain and create channel complexity and reservoir operations prevent the establishment of riparian vegetation on associated lakeshore. The result is simplified reservoir habitat upstream of dams and a relatively static and simplified riverine aquatic habitat below dams that has a low carrying capacity for bull trout.	McKenzie River – construction and operation of flood control and hydropower dams owned by Corps and EWEB.  Middle Fork Willamette River – construction and operation of Corps flood control dams.

PCE#	Primary Constituent Element	Baseline Condition	Leading Cause(s) of Baseline Condition
5	Water temperatures ranging from 36 to 59 degrees Fahrenheit (°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	South Fork and mainstem McKenzie River, including Cougar Lake, water temperatures sufficient for bull trout FMO needs. Currently degraded temperature baseline, at least seasonally, in the Middle Fork Willamette River below Hills Creek Dam; within Hills Creek Dam water temperatures are also likely sufficient for FMO needs.	McKenzie – naturally cool stream temps due to parent geology with benefits provided by Cougar Water Temperature Control.  Middle Fork Willamette – altered temperature regime caused by operation of Willamette Project dams for flood control and recreation.
6	In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.	Bull trout spawning and rearing areas are generally well upstream or not otherwise influenced by Corps dams.	
7	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	Generally altered hydrograph in the McKenzie though current FMO conditions support the mainstem McKenzie local population of bull trout. Degraded hydrograph in the Middle Fork Willamette River – ability of this PCE to support bull trout FMO unknown.	McKenzie River – construction and operation of flood control and hydropower dams owned by Corps and EWEB.  Middle Fork Willamette River – construction and operation of Corps flood control dams.

PCE#	Primary Constituent Element	Baseline Condition	Leading Cause(s) of Baseline Condition
8	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	As noted above in PCE# 5 and 7, the quantity and quality of flow is negatively affected by flood control management that has altered the natural flow and temperature regimes in the McKenzie and Middle Fork Willamette rivers.	McKenzie River – construction and operation of hydropower and flood control dams owned by Corps and EWEB.  Middle Fork Willamette River – construction and operation of Corps flood control dams.
9	Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.	Significantly degraded baseline. Altered flow and temperature regimes below dams (and associated habitat effects) along with reservoir habitat above dams, have significantly increased the abundance and productivity of non-native predatory and competing fish species within bull trout critical habitat.	Initial introduction of exotic fishes and bull frogs by the State of Oregon, combined with habitat modification from construction and operation of flood control and hydropower dams and construction and maintenance of revetments in the Willamette River and associated tributaries.

## 6. Analysis of Effects

“Effects of the action” refers to those direct and indirect effects of an action on the species or designated critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that will be added to the environmental baseline (50 CFR 402.2). Direct effects are considered immediate effects of the action on the species or designated critical habitat. Indirect effects are those caused by the proposed action and are later in time, but are still reasonably likely certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

### 6.1. Effects to Oregon Chub Critical Habitat

The effects to designated critical habitat for Oregon chub are relatively similar across the four subbasins where CHUs are located. Primarily, modified flows from flood control and hydropower operation and construction and maintenance of revetments have altered the floodplain and prevented channel form and development important in creating and maintaining off-channel habitat features essential to Oregon chub. Those CHUs hydrologically connected to reservoirs (e.g., Hospital Pond, Dexter Alcove Ponds) will be subjected to reservoir elevation fluctuations which will result in decreased habitat quality and availability at these locations during low water situations. Modified downstream flows also limit the ability for Oregon chub to disperse, although they also prevent the spread and introduction of non-native fish that predate on or compete with Oregon chub. The historic temperature regime below Corps projects has

been altered by the timing and amount of flow from the dams; however CHUs for Oregon chub are generally located in shallow off-channel locations where the summer water temperature is more likely influenced by ambient air temperatures. Overall, it is unlikely that the continued operation of the Willamette Project will result in significant additional degradation of Oregon chub critical habitat from existing conditions, and may in fact result in some incremental long-term benefit as described below.

The Action Agencies' implementation of many actions in the Willamette BiOps will likely improve conditions for Oregon chub critical habitat in the Willamette River Basin in the long-term. Examples of actions include improvements in downstream temperature and flow by managing releases to try and mimic historical temperature and hydrologic regimes, protection and restoration of wetlands and other off-channel features, and floodplain restoration. The proposed action also identifies a number of specific conservation measures designed to minimize adverse effects and provide new information necessary to conserve Oregon chub and their habitat. Collectively, these actions will improve tributary and mainstem function; protect and restore side-channel and off-channel habitat for fish migration, spawning, and rearing; and restore floodplain function providing benefits to native fishes, including Oregon chub and their designated critical habitat. Table 4 summarizes the environmental baseline and the probable short and long-term effects of the proposed action on designated Oregon chub critical habitat.

Each of the 15 CHUs that may be affected by the operation and maintenance of the Willamette Project, all are likely to be affected (see Table 1). These CHUs total approximately 62.3 acres (12.6 in the Santiam River watershed, 8.2 acres in the McKenzie River watershed, and 41.5 acres in the Middle Fork Willamette River watershed) of the approximately 132 acres of designated critical in the Willamette River Basin, or approximately 47 percent of all Oregon chub critical habitat. Despite the amount of critical habitat affected in the Middle Fork Willamette River drainage, many of these CHUs have consistently maintained steady or increasing populations of Oregon chub, indicating that the effects from the Willamette Projects on these CHUs are not likely to be causing further habitat degradation.

The proposed action, as modified by the NMFS' RPA, is anticipated to maintain the majority of PCEs in their current condition, albeit with minor improvements in the short term to those CHUs most closely linked to the floodplain downstream of Corps projects. Over the full timeframe of the proposed action (15 years), interim and permanent measures to address alternative flow management and habitat restoration will markedly improve many PCEs over baseline conditions.

In fact, based on stable and increasing populations of Oregon chub, the USFWS has proposed delisting the species in

**Table 3. Summary of Effects of the Action on Designated Oregon chub Critical Habitat**

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
1	Off-channel water bodies such as beaver ponds, oxbows, side-channels, stable backwater sloughs, low-gradient tributaries, and flooded marshes, including at least 0.12 ac of continuous aquatic surface area at depths between approximately 1.6 and 6.6 ft.	<p>Degraded baseline condition throughout the Willamette River Basin due to modified flows and channel simplification below dams in the Santiam River (including both the North and South Santiam Rivers), McKenzie River, and Middle Fork and Mainstem Willamette Rivers.</p> <p>Construction and operation of flood control and hydropower dams trap sediment and large woody debris and reduce peak flow events important to maintain and create off-channel complexity. Construction and maintenance of revetments has reduced channel migration zones, eliminating creation and maintenance oxbows and side channels. The result is a relatively static and simplified riverine aquatic habitat below dams.</p>	Pulse flows, LWD placement and other habitat restoration projects may incrementally improve habitat conditions over baseline.	Pulse flows, LWD placement and other habitat restoration projects may incrementally improve habitat conditions over baseline.

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
2	Aquatic vegetation covering a minimum of 0.06 ac (or between approximately 25 and 100 percent) of the total surface area of the habitat. This vegetation is primarily submergent for purposes of spawning, but also includes emergent and floating vegetation and algae, which are important for cover throughout the year. Areas with sufficient vegetation are likely to also have the following characteristics: Gradient less than 2.5 percent; no or very low water velocity in late spring and summer; silty, organic substrate; and abundant minute organisms such as rotifers, copepods, cladocerans, and chironomid larvae.	Degraded baseline condition throughout the Willamette River Basin due to modified flows and channel simplification below dams in the Santiam River (including both the North and South Santiam), McKenzie River, and Middle Fork and Mainstem Willamette Rivers. Reduction in peak flows and revetment construction and maintenance of revetments have resulted in less off channel formation and flushing of sediments from some areas leading to vegetative succession and potential habitat loss.	Pulse flows, LWD placement and other habitat restoration projects may incrementally improve conditions over baseline.	Alternative flow management and habitat restoration actions expected to improve conditions over baseline but not significantly.
3	Late spring and summer subsurface water temperatures between 59 and 78 °F, with natural diurnal and seasonal variation.	Generally altered hydrograph throughout the Willamette River Basin due changes in timing and volume of flows released from dams in the Santiam River (including both the North and South Santiam), McKenzie River, and Middle Fork and Mainstem Willamette Rivers. Late spring and summer temperatures are less affected than late summer and fall temperatures.	No effect	No effect

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
4	No or negligible levels of nonnative aquatic predatory or competitive species. Negligible is defined for the purpose of this rule as a minimal level of nonnative species that will still allow the Oregon chub to continue to survive and recover.	Degraded baseline in those CHUs that are hydrologically (even temporarily) connected to the Santiam River (including both the North and South Santiam), McKenzie River, and Middle Fork and Mainstem Willamette Rivers. In some cases, reduced peak flows have isolated some off-channel habitats, reducing access to these habitats by non-native fish that predate or compete with Oregon chub.	Pulse flows may facilitate introduction of non-native predatory or competitive species	Proposed action not likely to appreciably improve conditions over baseline,

## 6.2. Effects to Bull Trout Critical Habitat

The most significant impact to critical habitat is poor passage on Middle Fork Willamette River (Hills Creek, Lookout Point, and Dexter dams) and South Fork McKenzie River (Cougar dam) which impedes migration from spawning and rearing areas above Corps dams to FMO habitat below project dams. As noted earlier, isolation of individual bull trout populations continues to threaten the long term viability of the species in the Willamette River Basin. While passage barriers remain an issue in the Middle Fork Willamette River, establishment of “trap and haul” adult fish passage at Cougar Dam has improved connectivity between two breeding populations that have been largely biologically isolated since the construction of the dam in 1963. Possible improvements of downstream juvenile salmonid passage (either operationally or through construction of facilities at Cougar Dam and Lookout Point Dam) and upstream passage improvements at Dexter Dam will further connect these formerly isolated bull trout populations. The Corps is actively working to pursue the many conservation measures in the proposed action, as modified by the NMFS’ RPA; however, implementation is reliant on the outcome of feasibility studies and the procurement of authorizations and appropriations. Consequently, the effects of these actions on designated critical habitat are uncertain at this time.

Critical habitat for bull trout is designated for approximately 194.1 miles of streams and 8,889.5 acres of lake surface in the Upper Willamette Core Area (See Appendix A), the majority of which comprises mainstem river reaches below Willamette Project dams in the McKenzie and Middle Fork Willamette rivers, but does include Cougar Lake (South Fork McKenzie River) and Hills Creek Lake, Lookout Point Lake, and Dexter Lake (Middle Fork Willamette River), both of which provide important FMO habitat. Within the action area, no spawning or juvenile rearing habitat is expected to be directly affected by the operation of the Willamette Project as this habitat is on river reaches upstream of the Willamette Project. Impacts include very limited connectivity between spawning and rearing areas and FMO habitat as a result of project dams;



simplified habitat downstream of project dams from modified flows as a result of flood control operations and revetment maintenance; and creation of reservoirs has resulted in habitat that supports predatory and competitive non-native fish species, many of which were introduced by the state of Oregon. Table 5 summarizes the environmental baseline and the probable short and long-term effects of the proposed action on designated bull trout critical habitat:

**Table 5. Effects of the Action on Designated Bull Trout Critical Habitat**

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
1	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	Critical habitat area does not support this bull trout PCE.	Interim WTC measures at mainstem Middle Fork Willamette River expected to improve conditions over baseline.	Interim and permanent temperature control measures at the three mainstem Middle Fork Willamette River dams will significantly improve conditions over baseline.
2	Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	Degraded baseline condition in both the McKenzie and Middle Fork Willamette rivers. Three of four bull trout local populations isolated above dams. Lack of access to historical FMO habitat. Lack of passage at numerous dams within designated critical habitat. Some upstream passage improvement in South Fork McKenzie River from construction and operation of Cougar Dam trap and haul facility.	Pulse flows, LWD and other habitat restoration projects may incrementally improve conditions over baseline. No significant improvements expected.	Alternative flow management and habitat restoration actions expected to improve conditions over baseline but not significantly.
3	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Significantly degraded baseline. Altered flow and temperature regimes below dams (and associated habitat effects) along with migratory blockage of anadromous fish at impassable dams, have significantly impacted the productivity of stream reaches within bull trout critical habitat.	No effect	No effect

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
4	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	Degraded baseline condition in both the McKenzie and Middle Fork Willamette rivers. Construction and operation of flood control and hydropower dams trap sediment and large woody debris and reduce peak flow events important to maintain and create channel complexity and reservoir operations prevent the establishment of riparian vegetation on associated lakeshore. The result is simplified reservoir habitat upstream of dams and a relatively static and simplified riverine aquatic habitat below dams that has a low carrying capacity for bull trout.	Incremental improvements over baseline expected from implementation of mainstem and tributary flow targets, alternative flow strategies, and revised ramping criteria.	Proposed action not likely to appreciably improve conditions over baseline unless significant operational changes are made at one or more dams (e.g., run of river operation).
5	Water temperatures ranging from 36 to 59 degrees Fahrenheit (°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	South Fork and mainstem McKenzie River, including Cougar Lake, water temperatures sufficient for bull trout FMO needs. Currently degraded temperature baseline, at least seasonally, in the Middle Fork Willamette River below Hills Creek Dam; within Hills Creek Dam water temperatures are also likely sufficient for FMO needs.	No effect	No effect

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
6	In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.	Bull trout spawning and rearing areas are generally well upstream or not otherwise influenced by Corps dams.	Proposed operation of trap and haul facility at Cougar Dam will provide partial (upstream) passage for bull trout – significant improvement over baseline condition. Passage feasibility studies will inform long-term actions.	Known future downstream passage measures at Cougar and Lookout Point dams will greatly improve conditions over baseline.
7	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	Generally altered hydrograph in the McKenzie though current FMO conditions support the mainstem McKenzie local population of bull trout. Degraded hydrograph in the Middle Fork Willamette River – ability of this PCE to support bull trout FMO unknown.	Proposed continuation of the Chinook salmon outplant program above Project dams will improve baseline condition by providing forage base and improved stream productivity by inputs of marine derived nutrients from salmon carcasses.	Assumed implementation of passage and water temperature control measures, along with alternative flow management would be expected to significantly improve conditions over baseline.
8	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	As noted above in PCE# 5 and 7, the quantity and quality of flow is negatively affected by flood control management that has altered the natural flow and temperature regimes in the McKenzie and Middle Fork Willamette rivers.	Incremental improvements over baseline expected from implementation of mainstem and tributary flow targets, alternative flow strategies, and revised ramping criteria.	Proposed action not likely to appreciably improve conditions over baseline unless significant operational changes are made at one or more dams (e.g., run of river operation).

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
9	Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.	Significantly degraded baseline. Altered flow and temperature regimes below dams (and associated habitat effects) along with reservoir habitat above dams, have significantly increased the abundance and productivity of non-native predatory and competing fish species within bull trout critical habitat.	Incremental improvements over baseline expected from implementation of mainstem and tributary flow targets, alternative flow strategies, and revised ramping criteria. Minimal or no change in non-native fish populations in reservoirs	Proposed action not likely to appreciably improve conditions over baseline unless significant operational changes are made at one or more dams (e.g., run of river operation). Minimal or no change in non-native fish populations in reservoirs.

The proposed action, as modified by the NMFS' RPA, is anticipated to maintain the majority of PCEs in their currently degraded condition, albeit with minor improvements to some in the short term (0-5 years). However, over the full timeframe of the proposed action (15 years), interim and permanent measures to address fish passage, water temperature control, and alternative flow management will markedly improve many PCEs over baseline conditions.

## 7. Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

No new or additional non-Federal actions have been identified by the Corps since issuance of the 2008 USFWS BiOp that may affect Oregon chub or bull trout critical habitat. The cumulative effects identified and addressed in the USFWS 2008 BiOp are still valid and are herein incorporated by reference.

## 8. Conclusions

The Corps implementation of many actions in the Willamette BiOps will result in a variety of effects to Oregon chub and bull trout designated critical habitat, but is most likely to improve conditions for these species designated critical habitat in the Willamette River Basin over time. Examples of beneficial actions include improvements in downstream temperature and flow management, protection and restoration of wetlands and other off-channel features, and floodplain restoration or other landscape features that store water. The proposed action also identifies a number of specific conservation measures designed to minimize adverse effects to Oregon chub, bull trout and their habitats. Collectively, these actions will improve tributary and mainstem function; protect and restore side-channel and off-channel habitat for fish migration,

spawning, and rearing; and restore floodplain function providing benefits to native fishes, including bull trout and Oregon chub, and their designated critical habitats.

### 8.1. Oregon Chub

Of the 25 CHUs identified for Oregon chub, 15 are likely to be affected by the operation and maintenance of the Willamette Project; five sites in the Santiam Recovery Area, one in the Mid-Willamette Recovery Area, and nine in the Middle Fork Willamette Recovery Area. These 15 sites total 62.3 acres, or approximately 47 percent of designated critical habitat within the Willamette Basin recovery area. Adverse effects are a result of inhibiting maintenance and/or formation of natural channel and floodplain features essential to Oregon chub conservation. Despite the amount of critical habitat adversely affected in the Recovery Area, many of these CHUs have consistently maintained steady or increasing populations of Oregon chub, indicating that the effects from the Willamette Projects on these CHUs may not be causing further habitat degradation. Therefore, it is unlikely that implementation of the proposed action, as modified by the NMFS RPA, will further degrade designated Oregon chub critical habitat, and may in fact, likely result in some improved conditions for Oregon chub designated critical habitat. Further, proposed conservation actions will provide new information that will benefit the species throughout the Willamette Basin. The formal designation of Oregon chub critical habitat will not likely change the management strategies initiated in response to the 2008 USFWS BiOp and NMFS' RPA.

It is the Corps' conclusion that based on an analysis of effects from the proposed action, as modified by the NMFS RPA, the continued operation and maintenance of the Willamette Projects *may affect, and is likely to adversely affect* designated critical habitat for Oregon chub.

### 8.2. Bull Trout

Of the 194.1 stream miles and 8,899.5 acres of lake area designated as bull trout critical habitat in the Upper Willamette River CHU, the operation and maintenance of the Willamette Project is likely to adversely affect 106.8 river miles and 8,899.5 acres of lake area. This accounts for three percent of the total stream miles (3,370 stream miles) and 11 percent of the lake area (79,791.1 acres of lake area) within the Coastal draft recovery unit. Operation and maintenance of the Willamette Project under the 2008 biological opinion will likely result in some improved conditions for bull trout designated critical habitat, and proposed conservation actions will provide new information that will benefit the species throughout the Willamette Basin. The revised designation of bull trout critical habitat will not change the management strategies initiated in response to the 2008 USFWS BiOp and NMFS' RPA.

It is the Corps' conclusion that based on an analysis of effects from the proposed action, as modified by the NMFS RPA, the continued operation and maintenance of the Willamette Projects *may affect, and is likely to adversely affect* designated critical habitat for bull trout.

## 9. Literature Cited

- National Marine Fisheries Service. 2008. Consultation on the 'Willamette River Basin Flood Control Project
- U. S. Army Corps of Engineers. 2000. Biological Assessment (BA) of the Effects of the Willamette River Basin Flood Control Project on Species Listed under the Endangered Species Act, April 2000.
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- U.S. Fish and Wildlife Service. 2008. Biological Opinion on the Continued Operation and maintenance of the Willamette Basin Project to Oregon Chub, Bull Trout, and Bull Trout Critical Habitat Designated Under the Endangered Species Act.

**Appendix A – Designated Critical Habitat for Oregon Chub and Bull Trout in the Willamette Basin, Oregon.**





## **Exhibit 2**

**Biological Assessment**  
**Effects of the**  
**Willamette River Basin Flood Control Project**  
**On**  
**Oregon Chub and Bull Trout**  
**Designated Critical Habitat**



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## 1. Introduction

The U.S. Army Corps of Engineers (Corps) operates 13 dams and reservoirs in Oregon's Willamette River Basin (Willamette Project). The Corps is authorized by Congress to construct, operate and maintain the Willamette Project for such purposes as flood control, navigation, hydropower generation, recreation, fish and wildlife, water quality, and municipal and industrial water supply, irrigation, and recreation. The Willamette Project is authorized principally by three separate successive Flood Control Acts: 1938, 1950, and 1960. House Document 531, authorized by the Flood Control Act of May 17, 1950 (81<sup>st</sup> Congress, 2<sup>nd</sup> Session) remains the overall guiding legislation pertaining to operation and maintenance of the project.

The Willamette Project, located entirely in western Oregon, and provides a wide array of benefits to the citizens of Oregon and the region. For the purposes of Endangered Species Act (ESA) Section 7 consultation, the Willamette Project consists of 13 multipurpose dams, five fish hatcheries, and approximately 42 miles of revetments in the upper Willamette River Basin of western Oregon. The Corps operates and maintains the dams and revetments and funds the State of Oregon via the Oregon Department of Fish and Wildlife (ODFW) to manage and operate all facilities associated with the Willamette Hatchery Mitigation Program. Bonneville Power Administration (BPA) markets the hydropower generated at the dams, and the U.S. Bureau of Reclamation (Reclamation) contracts for a portion of the storage space in the Project reservoirs for irrigation. These three Federal agencies are considered the "Action Agencies" for the ESA consultation.

Since the early 1990s, the Willamette Project Action Agencies have engaged with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service [(USFWS) collectively referred to as the Services] on actions concerning operation and maintenance of the Willamette Project that may affect ESA-listed species or these species' designated critical habitat.

Beginning in April 2000, the Action Agencies prepared a biological assessment (Willamette BA) and formally consulted with the USFWS and NMFS on the effects of the operation and maintenance of the Willamette Project on ESA-listed species under their jurisdiction. A Supplemental Biological Assessment (Supplemental BA) and an Addendum to the Supplemental Biological Assessment (Addendum) were provided to the Services with additional information on the proposed action in, respectively, June and August 2007. On July 11, 2008 the USFWS and NMFS each separately issued their biological opinions: "*Continued Operation and maintenance of the Willamette Basin Project to Oregon Chub, Bull Trout, and Bull Trout Critical Habitat Designated Under the Endangered Species Act*" (USFWS BiOp) and "*Consultation on the 'Willamette River Basin Flood Control Project'*" (NMFS BiOp) respectively (collectively referred to as the 2008 BiOps).

The NMFS BiOp concluded that the proposed operations and maintenance of the Willamette Project was likely to jeopardize upper Willamette River Evolutionary Significant Unit (ESU) of Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*O. mykiss*) and was likely to adversely modify designated critical habitat for these species (NMFS 2008). The NMFS BiOp

also included a Reasonable and Prudent Alternative (RPA) to the Action Agencies proposed action that if implemented, would not result in jeopardy or adversely modify designated critical habitat for these species (NMFS RPA). The USFWS BiOp concluded that the proposed action, as modified by the NMFS RPA, was not likely to jeopardize the continued existence of Oregon chub (*Oregonichthys crameri*) or bull trout (*Salvelinus confluentus*) nor was it likely to adversely modify or destroy bull trout designated critical habitat (USFWS 2008).

The 2008 BiOps address operations and maintenance of the Willamette Project and conservation actions in multiple areas, including: habitat access and passage; water quantity and quality; habitat, hatcheries; fisheries, and research; monitoring, and evaluation (RM&E). The Corps is actively engaged in implementing the 2008 BiOps, particularly structural and operational modifications designed to minimize adverse effects and ultimately conserve the listed species and their designated critical habitats that are affected by the operation and maintenance of the Willamette Project.

On October 18, 2010 the USFWS revised designated critical habitat for bull trout in five western states, including Oregon (75 FR 63898). The Action Agencies have prepared this biological assessment (2015 BA) to evaluate the effects of implementing the proposed action, as modified by the NMFS RPA, for the operation and maintenance of the Willamette Project on designated critical habitat for bull trout.

The effects to bull trout (at both the individual and population level), and the other ESA-listed species addressed in the NMFS or USFWS BiOps have not changed nor have any new effects not previously considered been identified. The determinations for those species remain unchanged from those identified in the USFWS BiOp and effects to these species will not be addressed further in this consultation. Therefore, this 2015 BA will specifically address the effects of the proposed action, as modified by the NMFS RPA, on revised critical habitat for bull trout.

## 2. Description of the Proposed Action

The action proposed by the Action Agencies is described in the Willamette BA, and subsequent Supplemental BA and Addendum, and consists of multiple, separate actions that address the effects of:

- The operation and maintenance of 13 Federal dam and reservoir projects that are operated by the Corps as an integrated system for flood control, navigation, power generation, fish and wildlife, recreation, irrigation, and water quality and quantity.
- The operation and maintenance of approximately 42 miles of revetments within the Willamette River Basin.
- The operation and maintenance of five fish hatcheries.

- The operation and maintenance of Reclamation's allocation of irrigation water.
- The management of land around Willamette Project dams and reservoirs for recreation and other purposes, the bank protection program, emergency assistance program, and a suite of conservation actions to minimize Willamette Project effects on listed species and designated critical habitat.

### **2.1. National Marine Fisheries Service Reasonable and Prudent Alternative**

The NMFS RPA is additive to the Action Agencies proposed action and identifies additional actions necessary to ensure that the proposed action will not jeopardize listed anadromous salmonids or adversely modify their designated critical habitat. The NMFS RPA lists 96 actions that more specifically defined the proposed action in the following 10 categories: coordination; flow management; water contract program; fish passage; water quality; hatcheries; habitat; ESA compliance; construction projects environmental coordination and management; research, monitoring, and evaluation, and maintenance. The Corps continues to work with the other Action Agencies, and regional stakeholders to implement these actions consistent with the adaptive management process and regional coordination outlined in the 2008 BiOps.

A detailed description of the proposed action, as modified by the NMFS RPA can be found in Section 5 (beginning on page 38) of the USFWS BiOp and is herein incorporated by reference.

## **3. Action Area**

The geographic area of this supplemental BA is consistent with the description of the Willamette Project action area identified in the respective Willamette Project BAs and 2008 USFWS BiOp<sup>1</sup> (Figure 1). Generally, the geographic scope addressed in this 2011 BA encompasses the areas that are hydrologically influenced by the operation of the Willamette Projects, including:

- All river reaches, riparian zones, and floodplain areas located downstream of the 13 Willamette Project dams, including the mainstem Willamette River and the tributaries on which these facilities are located (i.e., mainstem reaches of the North Santiam and South Santiam rivers, Santiam River, McKenzie River, South Fork McKenzie River, Blue River, Fall Creek, Middle Fork Willamette River, Row River, Coast Fork Willamette River, and the Long Tom River). This action area also encompasses the 42 miles of streambank revetments maintained by the Corps and the adjacent stream reaches affected by those revetments.
- Stream reaches and land areas permanently or seasonally inundated by Willamette Project reservoirs in dry, average, and wet years.

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<sup>1</sup> A detailed description of the Willamette Project action area is in the 2008 USFWS BiOp (Section 4).



- All reaches of tributaries located upstream of Willamette Project dams that are presently or were historically accessible to listed fish before construction of the 13 dams in the Willamette Project.

The operations and maintenance of the Willamette Project was determined to have “no effect” on the bull trout critical habitat in the mainstem Columbia River, and is therefore not included in the evaluation of effects in this supplemental biological assessment.

Figure 1. The Willamette Project.



## **4. Status of Critical Habitat**

The USFWS published a final rule revising designated critical habitat for bull trout in October 2010 (75 FR 63898). The ESA defines critical habitat as "the specific areas within the geographical area occupied by the species, at the time it is listed..., on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed...upon a determination by the Secretary that such areas are essential for the conservation of the species."

### **4.1 Bull Trout Critical Habitat**

The USFWS has established six draft recovery units for bull trout in the Pacific Northwest; the Upper Willamette River CHU is part of the Coastal Recovery Unit. Within the Willamette River Basin, bull trout critical habitat is limited to part of the McKenzie River drainage, part of the Middle Fork Willamette River drainage, and a short segment of the mainstem Willamette River (75 FR 63898). The revised critical habitat designation for bull trout did not significantly expand the original critical habitat definition beyond its former designation. Rather, it filled in gaps such as Cougar, Lookout Point, Dexter, and Hills Creek Lakes, and expanded the official critical habitat further up streams such as the South Fork McKenzie River, the Middle Fork Willamette River and Swift Creek, whereas before it only included limited segments of those streams.

There are three known bull trout local populations in the McKenzie River and Middle Fork subbasins of western Oregon. With the exception of a short reach of the mainstem Willamette River and the mainstem Middle Fork Willamette River (including reservoirs) below Hills Creek Dam, segments designated as critical habitat are occupied by bull trout. Designated critical habitat in the Middle Fork Willamette River downstream of Dexter Dam is currently unoccupied by bull trout. Designated critical habitat between Hills Creek Dam and Lookout Point Dam may be occupied by bull trout entrained through Hills Creek Dam, but documentation is limited to a single individual caught by an angler in 2000 (USFWS 2008). Most of the critical habitat within the Willamette Project action area is considered foraging, migration, or overwintering (FMO) habitat, with suitable spawning and juvenile rearing habitat generally occurring farther upstream and outside of lands affected by the Willamette Project.

In the Willamette River Basin, approximately 194.1 miles of stream and 8,889.5 acres of lake surface area are designated as bull trout critical habitat in the McKenzie River and Middle Fork Willamette River subbasins (75 FR 63938), primarily in Lane County, but extending into Linn County. The operation and maintenance of the Willamette Project may affect critical habitat in the South Fork McKenzie River from the upstream end of Cougar Lake downstream to the confluence with the mainstem McKenzie River, in the mainstem McKenzie River from the confluence of the South Fork McKenzie River downstream to the confluence with the Willamette River, in Blue River from the dam downstream to the confluence with the McKenzie River, in the Middle Fork Willamette River from the upstream end of Hills Creek Lake downstream to the confluence of the mainstem Willamette River, and the mainstem Willamette

River from the confluence with the Middle Fork to the confluence with the McKenzie River. In total, the operation and maintenance of the Willamette Project may affect bull trout critical habitat in 106.8 river miles and 8,889.5 acres of lake surface.

Major alteration of the floodplain for flood control, navigation, agricultural development, and other actions (e.g., revetment construction and maintenance) that simplified or modified channel form and development have resulted in a significant reduction in bull trout habitat in the Willamette River Basin. Construction of hydropower and flood control dams have created barriers to fish passage that now leave all populations of bull trout in the Willamette River basin isolated and unable to migrate among subbasins; however, construction and operation of the Cougar Dam fish trap and haul facility has improved upstream migration for bull trout in the South For McKenzie River.

#### **4.1.1. Primary Constituent Elements for Bull Trout Critical Habitat**

Within designated critical habitat the PCEs are those specific physical and biological features known to be essential to the conservation of bull trout and may require special management consideration or protections.

The PCEs essential for the conservation of bull trout include, but are not limited to:

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
2. Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent or seasonal barriers.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, and undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
5. Water temperatures ranging from 36 to 59°F, with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-

the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9. Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

Among the many factors that contribute to degraded PCEs, those which appear to be particularly significant and have resulted in a legacy of degraded habitat conditions include fragmentation and isolation of local populations due to the proliferation of dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements; degradation of spawning and rearing habitat and upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads; the introduction and spread of nonnative fish species as a result of fish stocking and degraded habitat conditions, which compete with bull trout for limited resources; and degradation of foraging, migratory, and overwintering habitat resulting from reduced prey base, roads, agriculture, development, and dams. Table 1 describes the baseline condition of each PCE and the leading cause of the current condition.

**Table 1. Baseline Condition of Critical Habitat in the Upper Willamette Core Area**

PCE#	Primary Constituent Element	Baseline Condition	Leading Cause(s) of Baseline Condition
1	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	Critical habitat area does not support this bull trout PCE.	
2	Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	Degraded baseline condition in both the McKenzie and Middle Fork Willamette rivers. Three of four bull trout local populations isolated above dams. Lack of access to historical FMO habitat. Lack of passage at numerous dams within designated critical habitat. Some upstream passage improvement in South Fork McKenzie River from construction and operation of Cougar Dam trap and haul facility.	Construction and operation of flood control and hydropower dams owned by Corps and Eugene Water and Electric Board (EWEB).
3	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Significantly degraded baseline. Altered flow and temperature regimes below dams (and associated habitat effects) along with migratory blockage of anadromous fish at impassable dams, have significantly impacted the productivity of stream reaches within bull trout critical habitat.	McKenzie River – construction and operation of hydropower and flood control dams owned by Corps and EWEB.  Middle Fork Willamette River – construction and operation of Corps dams.
4	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	Degraded baseline condition in both the McKenzie and Middle Fork Willamette rivers. Construction and operation of flood control and hydropower dams trap sediment and large woody debris and reduce peak flow events important to maintain and create channel complexity and reservoir operations prevent the establishment of riparian vegetation on associated lakeshore. The result is simplified reservoir habitat upstream of dams and a relatively static and simplified riverine aquatic habitat below dams that has a low carrying capacity for bull trout.	McKenzie River – construction and operation of hydropower and flood control dams owned by Corps and EWEB.  Middle Fork Willamette River – construction and operation of Corps dams.

PCE#	Primary Constituent Element	Baseline Condition	Leading Cause(s) of Baseline Condition
5	Water temperatures ranging from 36 to 59 degrees Fahrenheit (°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	South Fork and mainstem McKenzie River, including Cougar Lake, water temperatures sufficient for bull trout FMO needs. Currently degraded temperature baseline, at least seasonally, in the Middle Fork Willamette River below Hills Creek Dam; within Hills Creek Dam water temperatures are also likely sufficient for FMO needs.	McKenzie – naturally cool stream temps due to parent geology with benefits provided by Cougar Water Temperature Control.  Middle Fork Willamette – altered temperature regime caused by operation of Willamette Project dams.
6	In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.	Bull trout spawning and rearing areas are generally well upstream or not otherwise influenced by Corps dams.	
7	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	Generally altered hydrograph in the McKenzie though current FMO conditions support the mainstem McKenzie local population of bull trout. Degraded hydrograph in the Middle Fork Willamette River – ability of this PCE to support bull trout FMO unknown.	McKenzie River – construction and operation of hydropower and flood control dams owned by Corps and EWEB.  Middle Fork Willamette River – construction and operation of Corps dams.



PCE#	Primary Constituent Element	Baseline Condition	Leading Cause(s) of Baseline Condition
8	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	As noted above in PCE# 5 and 7, the quantity and quality of flow is negatively affected by flood control management that has altered the natural flow and temperature regimes in the McKenzie and Middle Fork Willamette rivers.	McKenzie River – construction and operation of hydropower and flood control dams owned by Corps and EWEB.  Middle Fork Willamette River – construction and operation of Corps dams.
9	Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.	Significantly degraded baseline. Altered flow and temperature regimes below dams (and associated habitat effects) along with reservoir habitat above dams, have significantly increased the abundance and productivity of non-native predatory and competing fish species within bull trout critical habitat.	McKenzie River – construction and operation of hydropower and flood control dams owned by Corps and EWEB.  Middle Fork Willamette River – construction and operation of Corps dams.

## 5. Analysis of Effects

“Effects of the action” refers to those direct and indirect effects of an action on the species or designated critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that will be added to the environmental baseline (50 CFR 402.2). Direct effects are considered immediate effects of the action on the species or designated critical habitat. Indirect effects are those caused by the proposed action and are later in time, but are still reasonably likely certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

### 5.1. Effects to Bull Trout Critical Habitat

The most significant impact to critical habitat is poor passage on Middle Fork Willamette River (Hills Creek, Lookout Point, and Dexter dams) and South Fork McKenzie River (Cougar dam) which impedes migration from spawning and rearing areas above Corps dams to FMO habitat below project dams. As noted earlier, isolation of individual bull trout populations continues to threaten the long term viability of the species in the Willamette River Basin. While passage barriers remain an issue in the Middle Fork Willamette River, establishment of “trap and haul” adult fish passage at Cougar Dam has improved connectivity between two breeding populations that have been largely biologically isolated since the construction of the dam in 1963. Possible improvements of downstream juvenile salmonid passage (either operationally or through construction of facilities at Cougar Dam and Lookout Point Dam) and upstream passage

improvements at Dexter Dam will further connect these formerly isolated bull trout populations. The Corps is actively working to pursue the many conservation measures in the proposed action, as modified by the NMFS' RPA; however, implementation is reliant on the outcome of feasibility studies and the procurement of authorizations and appropriations. Consequently, the effects of these actions on designated critical habitat are uncertain at this time.

Critical habitat for bull trout is designated for approximately 194.1 miles of streams and 8,889.5 acres of lake surface in the Upper Willamette Core Area (See Appendix A), the majority of which comprises mainstem river reaches below Willamette Project dams in the McKenzie and Middle Fork Willamette rivers, but does include Cougar Lake (South Fork McKenzie River) and Hills Creek Lake, Lookout Point Lake, and Dexter Lake (Middle Fork Willamette River), both of which provide important FMO habitat. Within the action area, no spawning or juvenile rearing habitat is expected to be directly affected by the operation of the Willamette Project as this habitat is on river reaches upstream of the Willamette Project. Impacts include very limited connectivity between spawning and rearing areas and FMO habitat as a result of project dams; simplified habitat downstream of project dams from modified flows as a result of hydropower and flood control operation and revetment maintenance; and creation of reservoirs has resulted in habitat that supports predatory and competitive non-native fish species. Table 5 summarizes the environmental baseline and the probable short and long-term effects of the proposed action on designated bull trout critical habitat:

**Table 2. Effects of the Action on Designated Bull Trout Critical Habitat**

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
1	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	Critical habitat area does not support this bull trout PCE.	Interim WTC measures at mainstem Middle Fork Willamette River expected to improve conditions over baseline.	Interim and permanent WTC features and/or operational modifications at the three mainstem Middle Fork Willamette River dams will significantly improve conditions over baseline.

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
2	Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	Degraded baseline condition in both the McKenzie and Middle Fork Willamette rivers. Three of four bull trout local populations isolated above dams. Lack of access to historical FMO habitat. Lack of passage at numerous dams within designated critical habitat. Some upstream passage improvement in South Fork McKenzie River from construction and operation of Cougar Dam trap and haul facility.	Pulse flows, LWD and other habitat restoration projects may incrementally improve conditions over baseline. No significant improvements expected.	Alternative flow management and habitat restoration actions expected to improve conditions over baseline but not significantly.
3	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Significantly degraded baseline. Altered flow and temperature regimes below dams (and associated habitat effects) along with migratory blockage of anadromous fish at impassable dams, have significantly impacted the productivity of stream reaches within bull trout critical habitat.	No effect	No effect

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
4	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	Degraded baseline condition in both the McKenzie and Middle Fork Willamette rivers. Construction and operation of flood control and hydropower dams trap sediment and large woody debris and reduce peak flow events important to maintain and create channel complexity and reservoir operations prevent the establishment of riparian vegetation on associated lakeshore. The result is simplified reservoir habitat upstream of dams and a relatively static and simplified riverine aquatic habitat below dams that has a low carrying capacity for bull trout.	Incremental improvements over baseline expected from implementation of mainstem and tributary flow targets, alternative flow strategies, and revised ramping criteria.	Proposed action not likely to appreciably improve conditions over baseline unless significant operational changes are made at one or more dams (e.g., run of river operation).
5	Water temperatures ranging from 36 to 59 degrees Fahrenheit (°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.	South Fork and mainstem McKenzie River, including Cougar Lake, water temperatures sufficient for bull trout FMO needs. Currently degraded temperature baseline, at least seasonally, in the Middle Fork Willamette River below Hills Creek Dam; within Hills Creek Dam water temperatures are also likely sufficient for FMO needs.	No effect	No effect

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
6	In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.	Bull trout spawning and rearing areas are generally well upstream or not otherwise influenced by Corps dams.	Proposed operation of trap and haul facility at Cougar Dam will provide partial (upstream) passage for bull trout – significant improvement over baseline condition. Passage feasibility studies will inform long-term actions.	Known future construction of downstream passage at Cougar and Lookout Point dams will greatly improve conditions over baseline.
7	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	Generally altered hydrograph in the McKenzie though current FMO conditions support the mainstem McKenzie local population of bull trout. Degraded hydrograph in the Middle Fork Willamette River – ability of this PCE to support bull trout FMO unknown.	Proposed continuation of the Chinook salmon outplant program above Project dams will improve baseline condition by providing forage base and improved stream productivity by inputs of marine derived nutrients from salmon carcasses.	Assumed implementation of passage and water temperature control projects, along with alternative flow management would be expected to significantly improve conditions over baseline.
8	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	As noted above in PCE# 5 and 7, the quantity and quality of flow is negatively affected by flood control management that has altered the natural flow and temperature regimes in the McKenzie and Middle Fork Willamette rivers.	Incremental improvements over baseline expected from implementation of mainstem and tributary flow targets, alternative flow strategies, and revised ramping criteria.	Proposed action not likely to appreciably improve conditions over baseline unless significant operational changes are made at one or more dams (e.g., run of river operation).

PCE#	Primary Constituent Element	Baseline Condition	Effect of the Action	
			Short-term	Long-term
9	Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.	Significantly degraded baseline. Altered flow and temperature regimes below dams (and associated habitat effects) along with reservoir habitat above dams, have significantly increased the abundance and productivity of non-native predatory and competing fish species within bull trout critical habitat.	Incremental improvements over baseline expected from implementation of mainstem and tributary flow targets, alternative flow strategies, and revised ramping criteria. Minimal or no change in non-native fish populations in reservoirs	Proposed action not likely to appreciably improve conditions over baseline unless significant operational changes are made at one or more dams (e.g., run of river operation). Minimal or no change in non-native fish populations in reservoirs.

The proposed action, as modified by the NMFS' RPA, is anticipated to maintain the majority of PCEs in their currently degraded condition, albeit with minor improvements to some in the short term (0-5 years). However, over the full timeframe of the proposed action (15 years), interim and permanent measures to address fish passage, water temperature control, and alternative flow management will markedly improve many PCEs over baseline conditions.

## 6. Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

No new or additional non-Federal actions have been identified by the Corps since issuance of the 2008 USFWS BiOp that may affect bull trout critical habitat. The cumulative effects identified and addressed in the USFWS 2008 BiOp are still valid and are herein incorporated by reference.

## 7. Conclusions

The Corps implementation of the many actions identified in the Willamette BiOps will result in a variety of effects to bull trout designated critical habitat, but is most likely to improve conditions for the species designated critical habitat in the Willamette River Basin over time. Examples of beneficial actions include improvements in downstream temperature and flow management, protection and restoration of wetlands and other off-channel features, floodplain restoration or other landscape features that store water, and fish passage improvements. The proposed action also identifies a number of specific conservation measures designed to minimize adverse effects to Oregon chub, bull trout and their habitats. Collectively, these actions will improve tributary and mainstem function; protect and restore side-channel and off-channel habitat for fish

migration, spawning, and rearing; and restore floodplain function providing benefits to native fishes, including bull trout and their designated critical habitat.

### **8.1. Bull Trout Designated Critical Habitat**

Of the 194.1 stream miles and 8,899.5 acres of lake area designated as bull trout critical habitat in the Upper Willamette River CHU, the operation and maintenance of the Willamette Project is likely to adversely affect 106.8 river miles and 8,899.5 acres of lake area. This accounts for three percent of the total stream miles (3,370 stream miles) and 11 percent of the lake area (79,791.1 acres of lake area) within the Coastal draft recovery unit. Operation and maintenance of the Willamette Project under the 2008 biological opinion will likely result in some improved conditions for bull trout designated critical habitat, and proposed conservation actions will provide new information that will benefit the species throughout the Willamette Basin. The revised designation of bull trout critical habitat will not likely change the management strategies initiated in response to the 2008 USFWS BiOp and NMFS' RPA.

It is the Corps' conclusion that based on an analysis of effects from the proposed action, as modified by the NMFS RPA, the continued operation and maintenance of the Willamette Projects *may affect, and is likely to adversely affect* designated critical habitat for bull trout.

## 9. Literature Cited

- National Marine Fisheries Service. 2008. Consultation on the 'Willamette River Basin Flood Control Project
- U. S. Army Corps of Engineers. 2000. Biological Assessment (BA) of the Effects of the Willamette River Basin Flood Control Project on Species Listed under the Endangered Species Act, April 2000.
- U. S. Army Corps of Engineers. 2007. Supplemental Biological Assessment of the effects of the Willamette Basin Flood Control Project on Species Listed Under the Endangered Species Act, May 2007.
- U. S. Army Corps of Engineers. 2007. Addendum to the Supplemental Biological Assessment of the effects of the Willamette Basin Flood Control Project on Species Listed Under the Endangered Species Act, August 2007.
- U.S. Fish and Wildlife Service. 2008. Biological Opinion on the Continued Operation and maintenance of the Willamette Basin Project to Oregon Chub, Bull Trout, and Bull Trout Critical Habitat Designated Under the Endangered Species Act.



**Appendix A – Designated Critical Habitat for Bull Trout in the Willamette Basin, Oregon.**



## **Exhibit 3**

**From:** [Casey, Joyce E NWP](#)  
**To:** [Holm, Leanne NWP](#); [Brown, Kassandra A \(BPA\) - LN-7](#); [Peters, Rock D NWD](#)  
**Cc:** [Mackey, Tammy M NWP](#)  
**Subject:** Willamette Bull Trout BA  
**Date:** Monday, June 20, 2016 1:35:12 PM

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Greg Smith has generously agreed to bring this BA across the finish line for the Corps. I spoke with Greg today and he is going to come over and get some files he needs to do the work. First step is for him to give us a schedule, then he believes he can complete the BA in 30 to 45 days. If I ask for the schedule by the end of this week, that should be enough time for our reply to the court, yes?

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